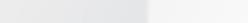




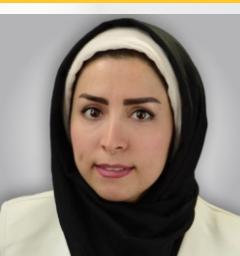
Manick Annamalai



Rafael Santos



Mostafa Elsharqawy



Hadis Karimipour



Abdallah Elsayed



Mario Martinez



Scott Brandon



John Donald



Erica Pensini



Hari Simha

Abdallah Elsayed,  
Mostafa Elsharqawy,  
Hari Simha, John Donald

P2

Hadis Karimipour, Erica Pensini,  
Rafael Santos, Mario Martinez

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Manick Annamalai,  
Scott Brandon

P4



New *Networking Events*  
coming soon to Engineering!

# Engineering Research

*Special Issue*

## 2017 FACULTY HIRE

### 2017 Year in Review

It was another great year for research in the *School of Engineering*. Along with welcoming 8 new faculty members, we also established many relationships with new potential partners. In 2017, our SOE Industry Liaison Office hosted or met with over 35 new industry representatives to discuss opportunities for collaborative research at the School. Industry ranged from auto makers, power generation to robotics manufacturers to breweries and beyond. Every representative who met with U of G Engineering was pleased with the level of

attention and interest they received from faculty. Many of these introductions led to new formal collaborative relationships leveraging funding from OCE, NSERC, OMAFRA and other sources. Moving into 2018, the Research and Entrepreneurship committee will be working to develop a structured networking platform called SoE Connect that will facilitate opportunities for research teams to meet with industry representatives and colleagues from across campus. If you have industry leads that you would like help with, please bring them forward to the SOE Industry Liaison Office and we'll work with you to help make your connections meaningful and productive.



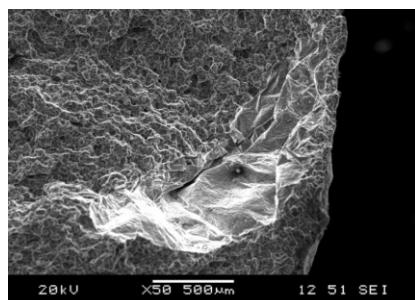
## MECHANICAL ENGINEERING

**Dr. Abdallah Elsayed** completed his undergraduate, masters and PhD in mechanical engineering at Ryerson University (Toronto, Ontario) and has worked in research and development in the automotive industry prior to joining the School of Engineering at Guelph. His research focus is in advanced manufacturing and characterisation of automotive and aerospace materials. He has conducted numerous collaborative projects involving universities and industry in Canada, USA and India including defect/inclusion analysis of magnesium aerospace components and solidification analysis of aluminum alloys. Abdallah is also a member of PEO, ASM international and TMS.



Abdallah Elsayed, Ph.D., EIT  
Assistant Professor

*Mechanical Engineering*

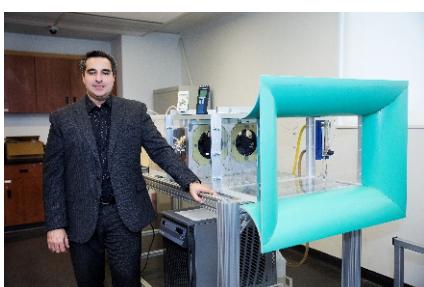


*Image caption: Electron micrograph of oxide defect (bright area) in a magnesium alloy component*



Mostafa Elsharqawy, Ph.D.,  
P.Eng.  
Assistant Professor

*Mechanical Engineering*



*Image caption: Dr. Elsharqawy with an open wind tunnel facility for measuring the performance of novel cooling coils for frozen food industry*

Elsharqawy currently leading research projects on sustainable refrigeration systems for the frozen food industry, as well as sustainable energy and safe water systems for remote and First Nation communities in Canada.



Hari Simha, BE, MSE,  
Ph.D., P.Eng.  
Assistant Professor

*Mechanical Engineering*

interested in using Bayesian methods for quantifying uncertainty in the results of computer simulations. A new area that I am initiating is in multi-physics modeling of solidification and using the results to predict meso-scale microstructures.

## WATER RESOURCES ENGINEERING



John R. Donald, Ph.D., P.Eng.  
Associate Professor

*Water Resources Engineering*

**Dr. John Donald, P.Eng.**, joined Guelph in 2013 with 20 years of experience in leadership roles in both engineering consulting and post-secondary education. John's first project was to coordinate the graduate attribute and curriculum improvement process (GACIP) required by the Canadian Engineering Accreditation Board. The University of Guelph has become a leader amongst Canadian engineering schools in this area. As well

as coordinating the GACIP, John has focused on excellence in engineering education, engineering leadership development and engineering design practice. John is President of the Canadian Engineering Education Association ([www.ceeaa-aceg.ca](http://www.ceeaa-aceg.ca)) and is a member of the National Initiative on Capacity Building and Knowledge Creation for Engineering Leadership (NICEL) community of practice. As the interaction between technology and society continues to accelerate, engineers need to intentionally prepare to be actively involved in leadership and decision-making. John's research efforts focus on the investigation and application of teaching methodologies to maximize the benefit that individuals trained as engineers bring to society. Current projects include the development,

investigation and evaluation of the impacts of the use of multi-media in large engineering design classes through the SOE Instructional Development Multimedia Studio; the analysis of leadership



and team skill development in the engineering curriculum; and the importance of professional effectiveness skills such as listening, reflection, and cultural competence in the interdisciplinary environment of engineering practice.

My main area of research is the mechanical behavior of materials, and I use experimental and computational tools to elucidate structure-property relationships for engineering materials. Specifically, I am interested in deformation, failure and fracture of metals. Currently, I am developing novel experiments to characterize failure surfaces and finite elements for problems with strong discontinuities. I am also



Hadis Karimipour, Ph.D.,  
P.Eng.  
Assistant Professor

*Engineering Systems & Computing  
Computer Engineering*

**Dr. Hadis Karimipour** is an Assistant Professor in the School of Engineering at the University of Guelph. She received her PhD degree in Electrical Engineering, specialized in power systems, from University of Alberta, Alberta, Canada, in Feb. 2016. She was a post-doctoral fellow at the Department of Electrical and Computer Engineering at the University of Calgary in 2016. During her post-doctoral

research, she focused on developing massive parallel algorithms on Graphic Processing Units (GPU) for different state estimation techniques and cyber security analysis of the smart grids. She joined the School of Engineering in 2017. Her research interests include large-scale power system state estimation, smart grid analysis, demand side management, and parallel and distributed computing.

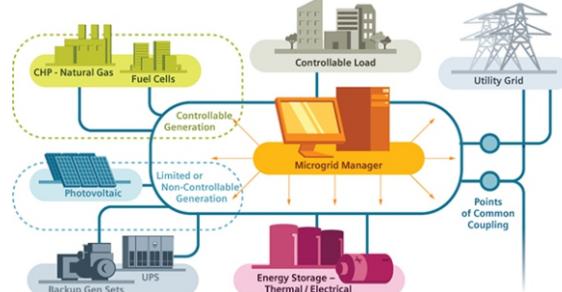


Image Source: <http://w3.usa.siemens.com/smartgrid/us/en/microgrid/pages/microgrids.aspx>

## ENVIRONMENTAL ENGINEERING

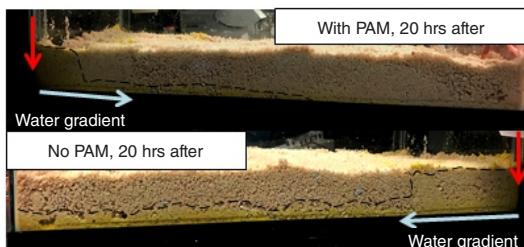


Erica Pensini, Ph.D., P.Eng.  
Assistant Professor

*Environmental Engineering*

**Dr. Pensini** is an early career researcher with an interdisciplinary training in environmental and chemical engineering. Her current research focuses on the development of novel in situ remediation technologies and water treatment. Major research areas include reactive polymeric gels and emulsions for the immobilization and in situ remediation of diverse contaminants,

and adsorbent materials for tailing pond water treatment.



*Image caption: Hexavalent chrome transport in a porous medium with and without polymeric reactive gels.*

**Dr. Rafael Santos** is Assistant Professor in Environmental Engineering at the University of Guelph, having previously been Professor in Applied Chemical and Environmental Sciences at Sheridan College for three years. Dr. Santos is a registered Professional Engineer of Ontario, and obtained his degrees from the University of Toronto (BASc and MASc) and the KU Leuven (PhD). Dr. Santos has also worked for several years in industry, at Zenon Environmental (Oakville, ON) and at Vale Inco (Sudbury, ON). He currently serves on the editorial board of Open Engineering, is an advisor for Publons, and is on the scientific committee of icRS 2018. Dr. Santos's main research expertise are in the areas of water and solid waste treatment, environmental remediation, applied mineralogy and geochemistry, and carbon dioxide sequestration. Recent projects include capturing CO<sub>2</sub> using desalination brine in a tubular reactor, and studying the reaction kinetics and mass transfer rates of wollastonite carbonation in a pressurized reactor.



Rafael Santos, Ph.D., P.Eng.  
Assistant Professor

*Environmental Engineering*



Mario Martinez, Ph.D.  
Assistant Professor

*Biological Engineering*

**Dr. Martinez'** research focuses on the development of processes and edible plant materials that result in foods with targeted metabolic responses. He holds a BSc in Agricultural Engineering, a MSc in Food Materials Science, a PhD in Chemistry and he was a Postdoctoral Research Associate on Carbohydrate Physical Chemistry and Digestion at the Whistler Center for Carbohydrate Research, Purdue University (USA). His research aims to

identify edible plant materials and technologies that result in foods that will reduce the risk of hyperglycemia-related diseases, such as obesity, type II diabetes mellitus and cardiovascular disease. Only during this academic year, he was invited to give 5 invited talks in international congresses to show his research outcomes. Dr. Martinez published more than 37 scientific papers in the highest peer-reviewed impact factor journals in the field of food science and engineering, 2 book chapters, more than 40 research abstracts and holds 1 WO patent. Dr. Martinez has extensive experience on the extrusion of edible plant tissues and the role of the biophysical features of cereal and pulse grains on nutrient bioaccessibility. He has also investigated food textural properties influenced by starch fine structure, the interactions between starch and other components and the manipulation of the starch digestion rate for low glycemic response. Dr. Martinez' research program approaches synergistically and mechanistically biochemistry, biophysics and engineering science to improve the nutritional and physical quality of cereal and pulse grains and the resultant foods. During his first 6 months as Assistant Professor at the University of Guelph, he was awarded with \$560,000 to conduct cutting-edge food research in a 1-year project that simultaneously contributes to fight the hunger in the world and decreases the prevalence of metabolic syndrome related diseases in the industrialized regions.



**Dr. Annamalai Manickavasagan (Manick), P. Eng** obtained Ph.D. from the University of Manitoba. He was the recipient of NSERC-Canada Graduate Scholarship for his doctoral research. After Ph.D., he worked with McCain Foods Limited (Canada) as Scientist for three years. Then he moved to Sultan Qaboos University (SQU), Oman as Assistant Professor, and worked for six years. During his tenure at

SQU, he supervised more than 10 graduate students, and received several awards including "Young Researcher - 2013", "Distinguished Researcher -



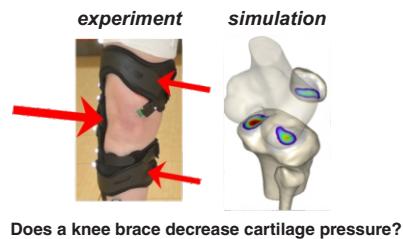
Image caption: Maple Powder Sample

Springer - 2 books, CABI - 1 book; Nova Science - 1 book). Manick joined the School of Engineering in Jan 2017 as an Associate Professor. His research interest is "Food Processing and Product Development for Health and Wellness". Currently he is teaching Bioreactor Design, Engineering & Design III, and Non-destructive Testing Techniques for Biological Products.



**Scott Brandon, Ph.D., EIT**  
Assistant Professor

Biomedical Engineering



Does a knee brace decrease cartilage pressure?

This is an exciting time of growth for the School of Engineering, and I am thrilled to be part of the team. I received a S.Sc.Eng. in mechanical engineering from Western, followed by an MSc. and Ph.D. in mechanical engineering from Queen's. Subsequently, I held postdoctoral positions at UNB and UW-Madison in the research areas of lower-limb

exoskeletons and computer simulation of surgical procedures, respectively. Now at the University of Guelph, my research theme within the biomedical program is assistive devices for human mobility. Using tools such as optical

motion capture and computational dynamic simulations, I seek to understand how internal tissue (e.g. cartilage, ligament, and muscle) forces are affected by the use of external devices. What happens inside your body if you change the material, geometry, or force applied by a brace? Can we develop smarter devices to improve performance? I'm excited for my first crop of graduate students to arrive this fall, and I look forward to building partnerships both internal and external to the School.



Left to right: Mostafa Elsharqawy, Hadis Karimipour, Hari Simha, Mario Martinez, Scott Brandon, Manick Annamalai, Rafael Santos, John Donald, Abdallah Elsayed, Erica Pensini